

REMARKS

I. Introduction

At the time of the Office Action dated February 7, 2006, claims 2-10 and 12-36 were pending in this application. In this Amendment, claims 2-7, 9, 12-19, 21, 25, 27-31 and 35 have been amended, claims 32 and 33 have been canceled, and new claims 37 and 38 have been added. Care has been exercised to avoid the introduction of new matter. Adequate descriptive support for the amendment of independent claims 12, 29, 30 and 31 can be found in, for example, Figs. 1 and 3 and relevant description of the specification. Claims 2-7, 9, 13-19, 21, 25, 27, 28 and 35 have been amended to improve wording. Claims 6 and 9 have respectively been amended to be dependent on claim 35, and claim 28 have been amended to be dependent on claim 13. In addition, adequate descriptive support for new claim 37 can be found in, for example, original claim 5, Fig.1 and relevant description of the specification, and adequate descriptive support for new claim 38 can be found in, for example, original claim 5, Fig.3 and relevant description of the specification.

II. The Rejection of Claims 3, 7-9, 12, 14, 26, 28, 31-34 and 36 under 35 U.S.C. §102(b)

Claims 3, 7-9, 12, 14, 26, 28, 31-34 and 36 have been rejected under 35 U.S.C. §102(b) as being anticipated by Guidash (U.S. Patent No. 6,552,323 ("Guidash 323")). In the statement of the rejection, the Examiner asserted that Guidash 323 discloses an image sensor with a shared output signal line identically corresponding to what is claimed.

In response, Applicants submit that Guidash 323 does not identically disclose a solid state imaging apparatus including all the limitations recited in independent claims 12 and 31, as amended. Specifically, Guidash 323 does not disclose, among other things, a solid state imaging

apparatus wherein “one of the floating diffusion sections is shared by four photoelectric elements which are adjacent to the floating diffusion section in a row direction and a column direction,” recited in claims 12 and 31. The claimed invention makes it possible to reduce the number of the floating diffusion sections per one photoelectric cell (pixel). Therefore, the aperture ratio of a photoelectric element to a photoelectric cell is increased, and the size of a photoelectric cell can be reduced. In other words, the size of the photoelectric cell can be reduced, while the photoelectric cell maintains a large aperture of the photoelectric element.

Guidash 323 in Fig. 2a discloses a solid state imaging apparatus comprising photoelectric elements 30a, 30b arranged in an array; switching elements TG transferring charges from the photoelectric elements; FD sections 10a, 10b connected to the photoelectric elements via the switching elements; and read lines TG coupled to the switching elements. As shown in Fig. 2a, every pixel 5 (photoelectric cell) has one FD section 10 in Guidash 323. This configuration is the same as that described in the background section of the specification. Accordingly, Guidash 323 does not disclose a solid state imaging apparatus in which a floating diffusion section is shared by four photoelectric sections which are adjacent to the floating diffusion section in the row and column directions, as claimed.

Guidash 323 describes that “the present invention shares the pixel output node and output signal line between at least two rows adjacent pixels 5” (see column 2, lines 53-60). However, such description does not suggest a floating diffusion section is shared by four photoelectric sections which are adjacent to the floating diffusion section in the row and column directions, as claimed.

Accordingly, Guidash 323 does not disclose a solid state imaging apparatus including all the limitations recited in independent claims 12 and 31, as amended, under 35 U.S.C. §102.

Dependent claims 3, 7-9, 14, 26, 28, 32-34 and 36 are also patentably distinguishable over Guidash 323 at least because these claims respectively include all the limitations recited in independent claims 12 and 31. Applicants, therefore, respectfully solicit withdrawal of the rejection of the claims under 35 U.S.C. §102(b) and favorable consideration thereof.

III. The Rejection of Claims 2, 4-6, 13, 15-25 and 35 under 35 U.S.C. §103(a)

Claims 2, 4-6, 13, 15-25 and 35 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Guidash 323 and Guidash (U.S. Patent No. 6,352,869 (“Guidash 869”)).

Guidash 869 in Fig. 3b teaches a solid state imaging apparatus comprising photoelectric elements 71, 73, 72, 74 arranged in arrays; switching elements 51, 61, 52, 62 transferring charges from the photoelectric elements; FD sections 42, 41 connected to the photoelectric elements via the switching elements; and read lines coupled to the switching elements, wherein the FD section 42 is shared by the photoelectric elements 71 and 73, and the FD section 41 is shared by the photoelectric elements 72 and 74. Moreover, as shown in Fig. 3a, two pixels (or photoelectric cells) 11 and 12 adjacent to each other in the column direction share one FD section 41. Similarly, two pixels 21 and 22 adjacent to each other in the column direction share one FD section 42. However, there is a reset transistor 36 provided between the FD sections 41 and 42, and the reset transistor 36 isolates the FD sections 41 and 42 from each other. Accordingly, Guidash 869 does not teach that the four pixels 11, 12, 21 and 22 adjacent to each other share one FD section.

Based on the foregoing, Applicants submit that Guidash 869 does not teach, among other things, a solid state imaging apparatus wherein “one of the floating diffusion sections is shared by four photoelectric elements which are adjacent to the floating diffusion section in a row

direction and a column direction,” recited in independent claims 12 and 31. It is, thus, apparent that Guidash 869 does not cure the above discussed deficiencies of Guidash 323. Therefore, dependent claims 2, 4-6, 13, 15-25 and 35 are patentably distinguishable over Guidash 323 and Guidash 869 at least because these claims respectively include all the limitations recited in independent claims 12 and 31. Applicants respectfully solicit withdrawal of the rejection of the claims under 35 U.S.C. §103(a) and favorable consideration thereof.

IV. The Rejection of Claims 29 and 30 under 35 U.S.C. §103(a)

Claims 29 and 30 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Guidash 323 in view of Patterson et al.

In response, Applicants submit that Guidash 323 and Patterson et al., either individually or in combination do not teach a camera comprising a solid state imaging apparatus including all the limitations recited in independent claims 29 and 30, as amended. Specifically, the applied combination does not teach, among other things, a camera comprising a solid state imaging apparatus wherein “one of the floating diffusion sections is shared by four photoelectric elements which are adjacent to the floating diffusion section in a row direction and a column direction,” recited in claims 29 and 30.

As discussed with respect to claims 12 and 31, Guidash 323 does not teach that “one of the floating diffusion sections is shared by four photoelectric elements which are adjacent to the floating diffusion section in a row direction and a column direction,” recited in claim 29 and 30. The secondary reference, Patterson et al., teaches an imaging device which may be used in cameras, but is silent on a floating diffusion section shared by four photoelectric elements which are adjacent to the floating diffusion section in a row direction and a column direction.

Accordingly, Guidash 323 and Patterson et al., either individually or in combination do not teach a camera comprising a solid state imaging apparatus including all the limitations recited in independent claims 29 and 30, as amended. Applicants, therefore, respectfully solicit withdrawal of the rejection of claims 29 and 30 under 35 U.S.C. §103(a) and favorable consideration thereof.

V. The Rejection of Claims 10 and 27 under 35 U.S.C. §103(a)

Claims 10 and 27 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Guidash 323 in view of Yamazaki et al.

In response, Applicants submit that dependent claims 10 and 27 are patentably distinguishable over Guidash 323 and Yamazaki et al. at least because these claims respectively include all the limitations recited in independent claims 32 and 12. It is noted that Yamazaki et al. does not teach a floating diffusion section shared by four photoelectric elements which are adjacent to the floating diffusion section in a row direction and a column direction, and thus, does not cure the deficiencies of Guidash 323.

Therefore, Applicants respectfully solicit withdrawal of the rejection of claims 10 and 27 under 35 U.S.C. §103(a) and favorable consideration thereof.

VI. New Claims 37 and 38

New claims 37 and 38 recite a plurality of a pair of signal lines for outputting signals from pixel amplifier transistors. Applicants specifically note that Guidash 323 and Guidash 869 disclose a single signal line (not a pair) as a signal line connected to pixel amplifier transistors, which is different from the claimed invention.

Since new claims 37 and 38 are not disclosed or taught by the cited references, Applicants, therefore, respectfully solicit favorable consideration of new claims 37 and 38.

VII. Conclusion

It should, therefore, be apparent that the imposed rejections have been overcome and that all pending claims are in condition for immediate allowance. Favorable consideration is, therefore, respectfully solicited.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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